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August 8, 1991

To: Wayne Hedberg, Permit Supervisor

From: Holland Shepherd, Senior Reclamation Specialist/Permit Lead *HS*

Re: Kennecott Clean-up Activities Related to Plan Amendments, M/035/002, Kennecott Utah Copper, Salt Lake County, Utah

Please find attached a letter and list of clean-up sites, that Kennecott recently sent to the Dept. of Environmental Quality. The letter describes areas that have been identified by Kennecott, DEQ and EPA, as sites needing to be remediated. Some of these areas fall within the confines of the present mining and reclamation plan or permit. I have starred those areas which may be of interest to the Division. These area may require permitting and adjustment of surety.

My question is how should the Division proceed on these actions. The operator is already involved with DEQ on these from a ground and surface water remediation of contamination perspective. Typically such changes would involve a change to the operator's MRP and would require Division review and approval. At this time the operator has already initiated the Bingham Creek action, which involves the construction of a repository within the operator's permit boundary. The operator has sent us the plans for this site as a courtesy, but has indicated that DOGM has no business in permitting the site.

hs

M035002.88

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G. Frank Joklik

President and Chief Executive Officer

June 27, 1991

Mr. James J. Scherer
Regional Administrator
U.S. EPA, Region VIII
999 18th Street, Suite 5090
Denver, CO 80202-2405

Mr. Kenneth L. Alkema, Director
Division of Environmental Health
Utah Department of Health
288 North 1460 West
P. O. Box 16690
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Kennecott

Re: Kennecott Voluntary Clean-up Activities

Gentlemen:

On April 11, 1991, Kennecott provided you with information concerning environmental conditions at thirteen sites on Kennecott Utah Copper property which may require response actions. Consistent with the commitment we made to you at that meeting, Kennecott's environmental program has continued to address the conditions at these sites.

As the next step in the process, Kennecott has prepared work plans for seven of these sites. These work plans describe source control, removal, or site characterization activities appropriate for a particular site. The work plans we have prepared are enclosed for your review. Work plans for the remaining sites will be provided to you by October.

Kennecott believes the work proposed in the enclosed plans can be accomplished with available resources within the time frames set out in the work plan schedules. We look forward to working with the EPA and the State of Utah in the implementation of these work plans.

Sincerely,

Frank Joklik

GFJ/lc

Enc.

cc w/enc: Robert L. Duprey, Director
Hazardous Waste Management Division
EPA, Region VIII

SUMMARY

KENNECOTT ENVIRONMENTAL ACTION WORKPLANS

Kennecott Corporation, through its wholly owned subsidiary, Kennecott Utah Copper, produces copper and other metals from the Bingham Canyon Mine and associated processing facilities in the western portion of Salt Lake County. The facilities cover an area of approximately 50 square miles, embracing territory that has been mined by dozens of operators for more than 125 years. The residue of many of these operations is still evident, although only a few companies connected with these operations still exist. In general, the residues are located in areas remote from population centers, and contain materials with metals of relatively low concentration, mobility, and toxicity.

As part of Kennecott's continuing environmental program, a comprehensive review of Kennecott Utah Copper operations has been conducted. The results of this review were reported in an Environmental Response document, which was provided to the State of Utah and the EPA on April 11, 1991. That review identified a total of 13 areas within the Kennecott Utah Copper operation that had known or suspected environmental problems, and proposed responses. These sites are summarized in Table I.

Following the presentation of that document, Kennecott developed workplans for the majority of the sites as indicated by the shaded items in Table I. This document presents those workplans. The workplans for the remaining sites will be submitted in October 1991.

Table I - Environmental Response Actions Identified

LOCATION	NATURE OF PROBLEM	PROPOSED RESPONSE	CURRENT STATUS
* Bingham Creek Tailings	Soil with elevated lead and arsenic concentrations	Remove to repository on Kennecott property	CERCLIS site; Removal action underway in residential area; workplan to be prepared for remaining area
* Bingham Channel Groundwater Plume	Acid and metal-bearing groundwater plume	Source control and natural remediation	CERCLIS site; Source control workplan prepared (Eastside Groundwater and Large Bingham Reservoir), investigation workplan prepared
Butterfield Waste Rock	Metal-bearing rock waste eroding into stream	Remove to Kennecott waste dump area	CERCLIS site; removal workplan prepared
State Motorcycle Park Tailings	Exposed metal-bearing tailings; groundwater impact	Investigate nature of material; cover and revegetate	CERCLIS site; investigation workplan prepared
Lark Waste Rock	Metal-bearing waste rock	Investigate material; remove to waste dump toe	CERCLIS site; investigation workplan prepared
* Magna Tailings Pond	Tailings dust, suspected groundwater contamination	Dust suppression	CERCLIS site; dust controlled, groundwater investigated
Kennecott Power Plant	No known impact	Upgrade ash slurry system	CERCLIS site; no action suggested
Smelter Slag Pile and Lagoon	Exposed slag, flue dust, and sediments; seepage to groundwater	Remove flue dust and sediments, drain lagoon, revegetate	CERCLIS site; workplan to be prepared
South Jordan Evaporation Ponds	Exposed metal-bearing sludge, possible seepage impact	Recontour berms, selective covering, reclamation	CERCLIS site; investigation workplan prepared

(table continued)

LOCATION	NATURE OF PROBLEM	PROPOSED RESPONSE	CURRENT STATUS
Kessler Canyon Drainage	Metal-bearing soil, groundwater degradation	Control ground and surface water at smelter, soil treatment	Workplan to be prepared
Magna Soils	Possible elevation of metals content in soils	Comprehensive survey	Investigation workplan prepared
* Diving Board Area Tailings	Potential impact on air and surface water quality	Remove tailings, construct basin, control water	Removal workplan prepared
Wastewater Treatment Plant Sludge	Sludge, groundwater degradation	Remove and treat sludge, dispose in tailings pond	Workplan to be prepared

Note: Shading indicates projects included in the current workplans

The projects that are included in this package fall into three categories of activity: source control actions, removal actions, and site characterizations. The work proposed in this package can be accomplished with available resources within the timeframes set out in the workplan schedules.

SOURCE CONTROL ACTIONS

EASTSIDE GROUNDWATER

Surface and groundwater infiltration into the alluvial fan deposits which extend eastward from the mouth of Bingham Canyon near Copperton has created a plume of acidic, metal-bearing water which covers approximately 1,500 acres downstream from Copperton along Bingham Creek. The current strategy for control and remediation of the plume includes elimination of sources of acid water to the plume. Many of the sources of acid seepage have already been eliminated by the installation and upgrading of the leachate collection system since 1965. However there is evidence that some acid leachate still escapes from the system at several locations.

Objective

The objective of this program is to determine the effectiveness of the eastside leachate collection system, and to construct facilities to complete the source control of acid leachate.

Program

The proposed activities are as follows:

- Investigation. To determine the effectiveness of the current source control three areas will be investigated:
 - Bingham Creek channel
 - Eastside leach collection system
 - Deep path seepage through rock beneath dumps.All wells in the area will be monitored. A report on the investigation will be prepared.
- Construction. Three sets of actions will be undertaken based on the results of the investigation to complete source control of acid leachate:
 - Construct seepage cutoff barrier across Bingham Creek Channel
 - Install leachate collection systems on gulches along eastside dumps that currently permit leachate escape
 - Extend the stormwater collection canal to the south to collect all runoff and seepage from disturbed areas.As-built details of construction will be provided.

LARGE BINGHAM RESERVOIR

The Large Bingham Reservoir is located to the east of Copperton. It was constructed in 1965, and has since that time stored acid and metal-bearing water as part of the stormwater management system of the Kennecott Utah Copper's Bingham Operation. Leakage from the facility has resulted in some contamination of the alluvial aquifer beneath. To prevent this leakage, Kennecott has undertaken an extensive program to line 460 acre feet with 12 inches of clay and with HDPE.

Objective

The objective of the proposed environmental response program is to prevent acid or metal-bearing water seeping from the Large Bingham Reservoir to the groundwater system.

Program

The implementation of the proposed action comprises the following:

- Site preparation, involving dewatering of the reservoir; removal or in-situ stabilization of sludge and copper tailings from within the reservoir basin; and preparation of the surface for the liners.
- Reservoir Lining, involving placement of a 12" clay liner; placement of a 60 mil (0.060") HDPE liner.
- Miscellaneous Construction, involving construction of a valved reservoir inlet structure; additional temporary concrete structures for diversion of water and overflow.
- Pump Station Refurbishing, involving foundation stabilization; structural strengthening; upgrading pumps, piping, and valves; and instrumentation.

As-built details of construction will be provided.

REMOVAL ACTIONS

BUTTERFIELD WASTE ROCK

The Butterfield Waste Rock pile is located in a steep-sided reach of Butterfield Canyon about three miles west of the town of Lark. The waste rock was produced during construction of the Butterfield Drainage Tunnel and mining operations by the Combined Metals Reduction Company in about 1912; the pile contains about 1.4 million tons and covers about 15 acres. There are an additional 75,000 tons of waste rock and tailings downstream from the dump. The waste contains arsenic, barium, cadmium, copper, lead, and zinc; however the material is not significantly leachable nor acid producing. The material is being actively eroded by the stream which flows over it.

Objective

The objective of the proposed environmental response program is to prevent further erosion of the waste rock materials into the stream channel.

Program

Kennecott plans to relocate the mine waste to a disposal area in Castro Gulch. This action requires the following:

- Prepare the disposal area in Castro Gulch: build retaining embankment; build haul road to repository site.
- Prepare Butterfield area: Divert stream and Butterfield Tunnel with cofferdam above and sediment dam below; relocate gas pipe out of streambed.
- Remove waste rock: Excavate and transport waste rock to repository; revegetate.
- Reclaim Butterfield site: Reclaim, revegetate and stabilize excavation site and haul roads.

As-built construction details will be provided.

DIVING BOARD

The Diving Board Area is located north of the Magna Concentrator. This 21-acre impoundment has been used for many years to impound tailings overflow during periods of scheduled and emergency shut down, and to control and direct surface water in this area. The Diving Board Area currently contains approximately 450,000 cubic yards of tailing and other materials. Dust from the Diving Board area has the potential to affect air quality.

Objective

The objectives of the Diving Board removal action are to eliminate the possibility of air or surface water impact and to facilitate tailings and surface water management.

Program

The actions to be undertaken to achieve the objectives are:

- characterization of the tailings to ensure that they can be disposed of in the Magna Pond;
- site preparation activities, comprising pipe relocations and structure removal;

- tailings removal, using excavation and slurry transport to the Magna Tailings pond;
- construction of concrete-lined impoundment.

As-built details of construction will be provided.

SITE CHARACTERIZATIONS

BINGHAM CREEK GROUNDWATER PLUME

Surface and groundwater infiltration into the alluvial fan deposits which extend eastward from the mouth of Bingham Canyon has created a plume of acidic, metal-bearing water which covers about 1,500 acres downstream from Copperton along Bingham Creek. The groundwater plume contains an estimated 110,000 acre feet of contaminated water. Monitoring of the plume shows little migration of the low-pH, high metals part of the plume during the past five years, as a result of source controls and neutralization reactions between the plume and the host alluvium.

Objective

The objective of this site characterization is to develop a more complete understanding of the behavior of the plume, and to install a system of wells to more closely monitor the effectiveness of source control and neutralization in eliminating the plume.

Program

The proposed activities are as follows:

- Install monitoring wells in and around the plume to more adequately identify the geology, soil chemistry, groundwater quality, and geohydrology parameters.
- Conduct a surface geophysical exploration and deep well installation to define the geologic setting of the plume, to better understand of the past and future behavior of the plume.
- Conduct a large (room) scale chemical testing program to demonstrate the chemical processes which are occurring as the plume contacts saturated alluvium.

A comprehensive site characterization report will be prepared integrating all available information and providing analysis and conclusions about the plume behavior based on that information.

SOUTH JORDAN EVAPORATION PONDS

The South Jordan Evaporation Ponds, located 7 miles east of the Bingham Mine, were used between 1936 and 1965 to store and evaporate Bingham Canyon watershed waters and waste dump leach process waters. Following construction of the Bingham reservoir in 1965, the ponds have been used on an emergency basis. Presently the site is dry, and contains about 4,600,000 tons of sludge covering about 375 acres. The sludges contain detectable arsenic, copper, lead, and zinc; but leach testing indicates limited groundwater contamination potential. Environmental actions considered by Kennecott consist of in-place remediation by covering some or all of the sludge, and revegetating.

Objective

The objective of the proposed site characterization program is to characterize the sludge materials.

Program

The site characterization will include the following:

- Characterization of the volume, depth, physical and chemical characteristics of the sludge materials in the various ponds.
- Evaluation of the extent to which the pond materials are contributing metals to groundwater.

Samples will be obtained from backhoe trenches and auger holes through the sludges and underlying subsoils. Two groundwater monitoring wells will be drilled and an air monitoring station installed.

A site characterization report describing the results of all studies will be prepared. This report will be used for subsequent evaluation of the most effective environmental action for these materials.

STATE MOTORCYCLE PARK TAILINGS

The State Motorcycle Park tailings, located just east of the town of Lark, were generated from copper ores from the Mascotte Mine and were deposited between 1909 and 1918 by the Ohio Copper Company. Kennecott leased the site to the Utah State Division of Parks and Recreation for use as a motorcycle park from 1977 until 1989. There are approximately 5,000,000 tons of tailings distributed over about 350 acres. The tailings contain metals, and are subject to acid generation. Environmental actions considered by Kennecott consist of covering some or all of the tailings, and revegetation.

Objective

The objective of the site characterization is to investigate potential acid generation, airborne dispersion, and groundwater contamination as a result of the tailings.

Program

The investigation program includes chemical, physical, and volumetric characterization of the tailings. Specific activities are:

- excavation of backhoe trenches and drilling auger holes into and through the tailings;
- installation of groundwater monitoring wells; and
- installation of an air monitoring station.

A site characterization report integrating information gained from this and previous investigations will be prepared. This document will be used for subsequent evaluation of the most effective environmental action for these materials.

LARK WASTE ROCK

The Lark Waste Rock Site consists of approximately 1,300,000 cubic yards of waste rock located in a total of six abandoned mine waste dumps which occupy an area of 40 acres directly east and north of the town of Lark. The waste rock originated from underground mining operations conducted in the late 1800s and early 1900s. Previous testing of the dumps has shown that the waste material contains measurable concentrations of copper, iron, lead, and zinc. Much of the material is acid generating and leaches low to moderate

levels of selected metal species. Environmental actions considered by Kennecott consist of either in-place remediation or removal of the waste rock.

Objective

The objective of the site characterization is to investigate acid generation potential of the waste rock and whether waste rock has impacted groundwater quality.

Program

The investigation program includes chemical, physical, and volumetric characterization of the tailings. Specific activities are:

- excavating backhoe trenches and drilling auger holes into and through the tailings;
- installation of groundwater monitoring wells; and
- installation of an air monitoring station.

A site characterization report integrating information gained from this and all previous investigations will be prepared. This report will be used for subsequent evaluation of the most effective environmental action for these materials.

MAGNA SOILS

The town of Magna is located in an industrialized area of western Salt Lake County. The presence of these industrial operations has raised concerns that local soils may be contaminated with metals. Potential sources of these metals include ore concentrates, blowing tailings dust, smelter particulate emissions, phosphate plant emissions, and auto exhaust. Available data indicates metals concentrations that are not considered to pose a significant threat to human health or the environment. However data is limited, and it is not possible to make definite conclusions about the soil metals levels.

Objective

The objective of this program is to determine with greater certainty the extent of metals present in Magna near surface soils and to evaluate the cause of any high metal concentrations found.

Program

The scope of this investigation is to sample and analyze soils samples taken at a range of depths at approximately 150 locations throughout the town of Magna. These results will be added to prior results from the town. If warranted by the findings, further investigation may be performed. The study will result in the preparation of a report on the soil metal concentrations in Magna.

SCHEDULE - OVERALL PROGRAM

YEAR	1991->	<---1992---	<---1993---	<---1994---
QUARTER	.3..4.	.1..2..3..4.	.1..2..3..4.	.1..2..3..4.
MONTH	JASOND	JFMAMJJASOND	JFMAMJJASOND	JFMAMJJASOND

SOURCE CONTROL ACTIONS:

Eastside Groundwater

Large Reservoir

REMOVAL ACTIONS:

Butterfield Rock

Diving Board

SITE CHARACTERIZATIONS:

Bingham Plume

Evaporation Ponds

State M/C Park

Lark Waste Rock

Magna Soils



GREAT
SALT LAKE

SMELTER SLAG
AND LAGOON

SMELTER WATER
KESSLER CANYON
DRAINAGE

WASTE
WATER
TREATMENT
PLANT

DIVING
BOARD
AREA

MAGNA
SOILS

MAGNA
TAILINGS
POND

80

2100 SOUTH

WORK PLAN SITES

OTHER SITES UNDER STUDY

K.U.C.

RAILROAD

TOWN OF
COPEPERTON

SMALL
RESERVOIR

LARGE
RESERVOIR

BINGHAM
CREEK
TAILINGS

EVAPORATION
PONDS